

TO: Ron and Loren
FR: David Fullerton
RE: Possible revisions to flexibility part of the DEFT Report.

I use strikeout and italics to show the subtractions and additions I made to the draft report. Hope this is helpful. If you like the language, you can cut and paste into the document

I. Flexible Operations

Discussions and analyses by the DEFT and its technical teams have highlighted the importance of improving habitat and enhancing success of fish migrations. However, the continuing problem associated with direct entrainment (and concomittant changes in survival in the south delta) has not been satisfactorily addressed for any members by the proposed actions in DEFT scenario A. DEFT Scenario B may greatly reduce entrainment impacts but is not expected to be compatible with the broader CALFED program.

The problems of entrainment are substantively different than most other DEFT and ERPP recommendations. Unlike habitat or water quality improvements, the problems of entrainment are largely species specific, except for the removal of lower level trophic supplies. If trophic impacts can be mitigated by the construction of more productive habitats within the delta then it may be possible to manage entrainment for a few species using monitoring data in the estuary.

Data on patterns of entrainment have recently been the focus of analysis by CUWA/Ag consultants and demonstrate the intermittent and intense impacts that have become common patterns in recent years as attention has focussed on the daily take of endangered species.

We anticipate using entrainment data to identify new tools to avoid reduce entrainment problems by reducing export impacts when the selected species are percieved to be at risk on a daily or weekly basis rather than monthly. Such operations will require reliable short-term monitoring data (such as has been provided by IEP in the last three years), a rapid response process of the export operations, and agreement on a reasonable limitation on the size, frequency and duration of export reductions "and increases". This process could occur without change to the 1995 Water Quality Control Plan by taking advantage of the little-used option to change daily export rates above and below the required longer-term targets.

Modeling of this type of tool will be difficult. Particle tracking and DSM outputs will allow some estimation of the protective value to fish of short-term export restrictions. ~~Water supply effects of such changes in operations~~

cannot be addressed by most of the current modeling tools. Daily models such as Jones & Stokes's Delta SOS Model will probably be the principal tool to estimate water supply impacts but are not comparable to DWRSIM runs of total system operations. Models currently used by DWR Operations may be enhanced to incorporate the operational changes and then used to estimate water supply impacts. These models consider reservoir operations, Delta requirements, power requirements, and other factors influencing operations. As these models encompass many factors, it may be as easy to use. Other daily models, such as Jones & Stokes's Delta SOS may also be used to estimate water supply impacts, but it may not be comparable because the model currently does not consider total system operations."

There are several broad issues that must be addressed when considering flexible management:

1. *Desired export patterns.* *Is it possible to define new temporal export patterns that reduce entrainment impacts for a suite of species while maintaining or improving export supplies? Initial indications based upon historic take data pumps show promise. The take of Delta smelt, salmon, steelhead, Sacramento splittail, and striped bass is very patchy. In an average year, most entrainment for each of these species occurs over a limited number of days. Therefore, it may be possible to couple reduced exports when fish densities are high with increased exports when fish densities are low*
2. *Sharing the benefits of flexibility with the current system.* *How the benefits derivable from flexible operations are split divided between water users and the environment is a policy question. At one extreme, the method could be used to maintain entrainment at current levels while increasing exports. At the other extreme, the method could be used to maintain existing levels of exports while reducing entrainment.*
3. *Sharing the benefits of flexibility generated by improvements in the water system.* *New facilities and new regulatory rules (e.g., ISDP, Joint Point of Diversion, Madera Ranch) could provide flexibility to further reduce entrainment impacts, or new water supplies, or a combination. How should the benefits be shared?*
4. *The form of the environmental benefits.* *The environmental benefits could be derived in several ways:*

(1) A new set of operational rules that explicitly incorporate flexibility. For example, the regulatory agencies might be allowed to impose export curtailments on a certain number of days per year, based upon real-time monitoring. In return, export standards might be relaxed during some periods when curtailments are not in effect.

(2) An environmental credits system. An environmental manager would be allowed to build up water credits in the export system which could be traded with the water projects to reduce pumping during periods when entrainment appears to be a problem. The manager would be granted or would acquire rights to pump water (e.g., pumping above the existing E/I standard, a share in the capacity of ISDP, a share of JPOD) and rights to store water (e.g., in San Luis Reservoir, MWD's Eastside Reservoir, Madera Ranch, Delta Wetlands). Pumped and stored water would become credits against pumping. The manager could also acquire credits through option contracts with water users.

(3) Some combination of new rules and environmental credits.

As an example of the way this tool might develop, 1. the salvage data may identify a number of days in each month when each species is at risk 2. the average number of times when salvage impacts overlap across species can be calculated to weight the number of days for each species 3. hydrodynamic modeling might show the duration, degree and frequency of decreases in exports required to achieve a given level of protection under different flow conditions for each species. "Under different hydrology or flow conditions, the duration, degree and frequency of decreases in exports required to achieve a given level of protection for each species may vary." 4. the regulatory agencies might then be able to call for export restrictions, consistent with those findings, in order to avoid entrainment rather than having to wait for take limits to be exceeded: 5. On the other days of the month export rates could be relaxed to minimize impacts on deliveries, as long as all other multi-species protection measures are met.

1. This work should be conducted through the DNCT, not the DEFT alone. Insert wherever appropriate.

2. The institutional framework proposed by Fullerton has much higher potential for increased fisheries protection than the approach implicit in #4. We should state so where appropriate and include by reference Fullerton's Real Time Management of Exports paper of 9-3-98.

[I'm not sure how we would fit "examples" into the DEFT report. Since these all involve improvements to the water system, they might belong more in the No Name Group report. In any case, here is a short writeup on some examples of how system improvements could be implemented in ways beneficial to the environment and the water users:]

1. ISDP

Rules Approach: Allow use of the 4 new pumps under specified conditions (e.g., in the winter during periods of high flow). In return, grant the regulatory agencies the right to suspend pumping for x days during the months of March - June. The combination could increase exports while simultaneously allowing reduced entrainment through real-time monitoring.

Credits Approach: Grant rights to part of the capacity of the 4 new pumps. When the pumps are used, the environment gains control of its share of the water pumped and rights to canal capacity for its water. Place the water in storage. Use to reduce pumping

at a future date.

2. *Joint Point of Diversion. Same discussion. Yield can be balanced against new real time standards or yield can be shared.*
3. *Relaxations of E/I Ratio. Same discussion. Yield can be balanced against new real time standards or yield can be shared.*
4. *Madera Ranch*

Rules Approach: New south of Delta storage creates additional export supplies. Those new supplies justify granting the regulatory agencies y days per year of project shutdowns. If the conditions are set correctly, exports can increase while entrainment decreases.

Credits Approach: The environment controls part of the capacity. It may place into this storage, water it has control over -- e.g., water pumped for the environment using ISDP, JPOD, or relaxation of the E/I ratio. The water in storage can be traded with the projects for reduced pumping at time of increased entrainment.

5. *Enlarged Shasta*

Rights Approach: New upstream storage creates additional project export supplies. This new yield justifies granting additional requirements on the CVP. Those new supplies justify granting the regulatory agencies z days per year of project shutdowns. If the conditions are set correctly, exports can increase while entrainment decreases.

Credits Approach: The environmental manager would control some fraction of the new storage and could use the water captured with the storage as it saw fit -- for increased Delta outflow, to create south of Delta credits, etc.

DEFT Issues to Management (really DNCT)

Does management support continued evaluation of real-time management (operational flexibility) of export operations?

Current agency negotiations over possible regulatory constraints on ISDP and JPOD may be in conflict with the use of these measures to promote real-time operations. How can this conflict be resolved?